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ABSTRACT

This Child Development Associate (CDA) training module helps interns develop children's science exploration and discovery skills. This process of discovering is known as sciencing. Teachers can create the climate for discovery by becoming actively involved with the children, by sharing the children's natural curiosity about their environment, and encouraging them to use their sciencing skills in all settings of the total learning environment. Objectives are stipulated, activities for achieving each objective are suggested, and an assessment checklist is provided. A study guide emphasizes (1) goals and values of sciencing, (2) ways to initiate and integrate science experiences in the classroom, (3) teacher guidelines for science experiences, (4) construction of a science center, and (5) sciencing in settings other than the science center. Resources for further study are listed. Supplementary related activities, an inventory of materials and equipment, ideas for discovery boxes, sample science unit lesson plans, stories and references for children, and a list of science books are included. (Author/RH)

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Competency Based Training Module #16

SCIENCING AND DISCOVERY

by

Stefanie Workman
and
Susan Pintchovski

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NOTE TO THE INTERN:

This CDA training module has been prepared as a guide for you and your CDA Advisor to help you to develop certain practical skills necessary for your work in an early childhood center. Although it contains many useful ideas, it is not intended to be a self-study program. Many decisions about your training experiences are left up to you and your CDA Advisor. The activities given in this module are "suggested" activities, and should be used if they are appropriate to your learning needs. You or your Advisor may come up with other activities more appropriate for your particular situation, children, or background of experience and training.

Your Advisor will evaluate your performance in each of the objectives. S/he may do so right away on the basis of skills you already have, or s/he may evaluate you after you have done some learning activities, or both. If you think you already have the skills required by some of the objectives, you should ask to be evaluated right away. You may not have to do any activities for some of the objectives. You do, however, have to demonstrate the required skills for your advisor; you cannot just tell s/him that you have the skills. If your advisor has already observed some of the skills before you entered this module, s/he may check you off on those skills without further observation.

When your Advisor has evaluated your performance in an objective area as satisfactory, s/he will initial and date that objective as completed in your copy of this module. When all of the objectives have been initialled, you have completed the requirements of this module and have earned credit. Keep this module as your permanent record of completion, and as a reference to use in your classroom.

As you can see, how fast you are able to complete this module depends on a lot of things: how much time and effort you can put into it; how much help your Advisor can give you; how much experience and training you have already had.

The Arizona/Nevada HSST/CDA Program hopes that you find your participation in CDA a valuable and practical training experience. We would appreciate any suggestions you may have for improvements in the training program and in this module.

SCIENCING AND DISCOVERY

CDA TRAINING MODULE #16

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This Module relates to the following CDA Functional Areas:

2 - Healthy

5 - Cognitive

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SCIENCING AND DISCOVERY

INTRODUCTION

"Teacher, teacher, look at this bug, I found!" How many times have we heard one of our children say this, with a face full of wonder and excitement? How many times have we responded with, "Ooo, ugh! Get that bug away. I don't like them!" A teacher who answers in this way has just missed a prime teaching opportunity when the child could have been encouraged to observe and investigate further the novelties of a bug.

Children are innate and natural scientists; they love to explore, take apart and combine the curious. The whole world is their's to touch, smell, taste, hear, see and discover. Science in the early childhood setting must recognize that children are active learners. The process of sciencing emphasizes that it is more important to provide opportunities for children to handle, observe, compare and question, than to present them with a collection of facts that they will be expected to remember.

Teachers, by providing time, materials and activities, are helping children to develop vital skills. Teachers can create the climate for discovery by becoming actively involved with the children and by sharing their natural curiosity about their environment. Sciencing becomes more meaningful to children when teachers integrate science experiences within the total environment. Science is all around us, to be explored and discovered everywhere. Teachers can help children to increase their understanding of the world by encouraging them to use their sciencing skills in <u>all</u> settings of the total learning environment. In addition, the science center should function as a discovery area and offer individualized activities which provide for the different abilities, interests and styles of different children.

Though it often seems as if the teacher is totally responsible for deciding upon the content of the science curriculum, the children and the surrounding environment frequently play a determining role. When a child or the environment initiates a a science experience (such as in the opening example) a sensitive teacher will plan for, reinforce, and extend the child's interests through related experiences.

OBJECTIVES, ACTIVITIES, ASSESSMENT

CDA Intern's Name_____

Date of Entry_____Date of Completion_____

OBJECTIVES	SUGGESTED ACTIVITIES
1. The Intern will demonstrate an awareness of the values and skills of sciencing for children.	1. Read Section I of the Study Guide.
ASSESSMENT	a. Discuss with your Advisor "what is sciencing?" and the ways in which it helps foster social, emotional, physical and cognitive development in children.
_____ date/initial	b. Do Activity 1A of Supplement #1 - Related Activities. Identify the teacher and child situations with the terms provided. Discuss your answers with your Advisor.
	c. Use a science activity (such as a box of rocks and sorting trays) and role-play with your Advisor the skills of sciencing.
	d. Observe a child involved in a sciencing experience. How did he use these skills: - observing - questioning - classifying (matching, sorting) - comparing - describing - predicting - proving Repeat the activity a second time with another child. Your Advisor will do the same activity. Share your notes and discuss the children's skills, and opportunities to develop new skills. Evaluate the sciencing experience. Is it consistent with the Study Guide's discussion in Section I?
	e. Discuss with your Advisor why it is more important for pre-school children to develop skills of sciencing than to learn facts.

OBJECTIVES	SUGGESTED ACTIVITIES
2. The Intern will demonstrate the ability to follow-up on science interests displayed by the children or initiated by the environment. ASSESSMENT _____ date/initial	2. Read Section II of the Study Guide. a. Give examples to your Advisor of science experiences initiated by a child or the environment. Discuss why it is important for the pre-school program to allow for both environment- and child-initiated experiences as well as teacher-planned experiences. b. For one week, record the situations in which children have expressed interest or curiosity about a particular happening. Discuss how your plans had to be altered and what activities were used to follow-up these interests.
3. The Intern will demonstrate the ability to initiate and plan science experiences that encourage children to use their sciencing skills. ASSESSMENT _____ date/initial	3. Read Section III of the Study Guide. a. Discuss with your Advisor the important role materials play in science experiences. b. Do Activity 1B of Supplement #1 - Related Activities. Find nine (9) manipulative experiences from the list. C. Do Activity 1C of Supplement #1 - Related Activities. Identify teacher questions and statements which encourage exploration and the use of sciencing skills. d. Role play a science activity with your Advisor (with the Intern first taking the teacher's role). Encourage your "child" to verbalize his observations and actions; ask questions; provide appropriate science terms. Discuss the quality of the teacher - "child" interaction. e. Ask your Advisor to observe you initiating and carrying out a science experience with an individual child or a small group of children. Evaluate the verbal and non-verbal teacher techniques you used in the experience. Outline areas needing improvement.

OBJECTIVES	SUGGESTED ACTIVITIES
4. The Intern will demonstrate an ability to create and maintain a science center in which children can use their sciencing skills. ASSESSMENT _____ date/initial	4. Read Section IV of the Study Guide. a. Provide a science center which is set up and designed for sciencing with individual children and small groups. Evaluate with your Advisor its location, permanent equipment and its appeal to children. b. Inventory your science materials and equipment. Include your home and school resources. Refer to Supplement #2 - Inventory of Materials and Equipment. Identify materials needed and make plans to secure them. Organize your resources in an easily accessible storage area. c. Select one science topic from the following suggestions: water, magnetism, the senses, simple machines, gravity, rocks and minerals. Plan (write into your lesson plans) and carry out science experiences related to the topic at the science center for two weeks. For the science topic create and provide: - 3 discovery boxes. - 3 teacher-made learning games. - 2 kinds of audio-visual resources (e.g. books, records, picture collections). d. Try a novel attention-grabber for drawing children into the science center.
5. The Intern will incorporate and integrate a science topic into other environmental settings. ASSESSMENT _____ date/initial	5. Read Section V of the Study Guide. a. Do Activity 1D of Supplement #1 - Related Activities. Label statements as TRUE or FALSE. Explain your answers to your Advisor. b. Select one science topic (use the same topic chosen for Activity 4c) and plan (write into your lesson plans) and carry out extending and reinforcing activities for two weeks. Include: - Activities in 4 other learning centers. - 2 activities during other times in the schedule (e.g. meals, bus, transitions). - 3 activities outdoors.

OBJECTIVES	SUGGESTED ACTIVITIES
	- Activities involving the community. - Activities with small groups and large groups. Have your Advisor observe you in each area and help you evaluate teacher techniques, appropriateness of materials, and children's reactions. Outline suggestions for improvement.
6. The Intern will make an implementation plan, stating how the abilities, techniques and information gained through completing this module will be incorporated into s/his on-going teaching.	6. Review with your Advisor the new abilities you have acquired in planning and providing for sciencing in your classroom. Make an implementation plan answering these questions: a. What teacher techniques and guidelines will you use in your interactions with children? b. How will you integrate science into your daily program? c. When will you review your implementation progress with your Advisor? Insert your Implementation Plan into your CDA Portfolio and refer to it periodically to check your own progress.
ASSESSMENT _____ date/initial	

SCIENCING AND DISCOVERY

STUDY GUIDE

I. Goals and Philosophy

A. What is Sciencing?

1. Sciencing is a natural process, one which begins at birth, in which children are the active participants.

2. Sciencing is the process of discovering. It is not just collecting and storing facts which someone else has already discovered.

3. Sciencing involves manipulating (handling), observing, questioning, classifying (sorting and matching), comparing, describing, predicting, and proving. Child discover best by using all of their senses with "hands-on" materials.

4. Sciencing is a building process in which the child adds new ideas and information to his foundation of familiar experiences.

5. Science is an integral part of a child's world and cannot be experienced as an isolated event. Children are naturally curious about the world around them.

6. Sciencing is an individualized experience which recognizes the different developmental levels of thinking.

B. Values of Sciencing for the Pre-schooler.

1. Sciencing skills (i.e. manipulating, classifying, predicting) are the same as those used by children in their self-directed learning. Fostering these skills, therefore, can help encourage children to become independent learners.

2. Confidence is built when a child feels he can affect his environment. A feeling of security can be derived from experiencing and recognizing a sense of order in the world around him.

3. As a child increases his knowledge of the world, he dispells fear that comes from the unknown. This helps to develop within the child feelings of mastery and problem-solving capability.

4. Encouraging children to become totally involved with their senses in exploring "hands-on" materials stimulates curiosity.

5. Sciencing skills help to foster the development of logical thinking by encouraging children to question, compare, classify, predict and prove.

6. Language development is promoted when children are asked questions and encouraged to verbalize their observations, their activities and findings.

7. Creative thinking and imagination are important aspects of the discovery process. Children use their creative thinking when they attempt to solve problems by predicting and by manipulating materials. Applying knowledge already acquired by experience in order to solve new problems is a creative process.

8. When sciencing is experienced as a small group effort, children are encouraged to appreciate the contributions of others. Social growth is promoted through cooperative group effort.

C. Skills Children Use in Sciencing

Science experiences for pre-school children should allow the child enough time to use their own skills of sciencing in the discovery process. The teacher's role is to encourage each child to develop these skills at his own individual level. You many recognize some of the following skills more readily than others as behaviors normally associated with pre-school children. All of the following skills, however, are part of the young child's natural repertoire of behaviors used in the course of play. A brief definition of each will help to clarify the kinds of behaviors associated with each skill.

1. Observing involves all of the child's senses (hearing, smelling, feeling, tasting, seeing) focussed on a specific activity, object or event. Observing can be encouraged by the teacher by providing enough time for children, asking open-ended questions, and by giving verbal or non-verbal approval for their behavior.

2. Questioning may initiate a science experience with the encouragement of a sensitive adult. Children should also be encouraged to ask questions during a teacher-initiated science activity to stimulate further observation and investigation. In a broader sense, however, questioning often takes the form of a non-verbal process in which a child, through manipulation, seeks to find out the "why" of a particular experience. The questions a child is asking himself can be seen in his repetition of an activity in order to satisfy his curiosity.

3. Classifying is the process of matching, sorting and grouping objects or experiences according to their similarities or differences. A pre-school child may be able to classify a group of objects without knowing the name of the attribute (characteristic) that was used. The teacher can provide the words while encouraging children to use their own classification system. Individual differences in the ability to classify will vary with age and developmental level. For example, young threes can non-verbally group objects according to shape whereas older fives can group objects according to both shape and color and can name the attributes.

4. Comparing is a special kind of observing in which children examine two or more objects or experiences for similarities and differences. Individual developmental levels will influence the degree to which detailed comparisons can be made. In addition, when comparing experiences in sequence, such as with taste or smell jars, the pre-school child will need to repeat the activity several times in order to make comparisons.

5. Describing is the process of putting what is happening into words. The teacher plays an important role by encouraging children to verbally communicate their actions, questions and predictions. The adults can provide the necessary vocabulary (such as float, balance, inflate, temperature) for children to verbalize their experience as it happens.

6. Predicting is the process of making judgements or educated guesses based on the experiences and knowledge the child already possesses. He uses this collection of information and applies it to a new situation or experience to make a judgement about the outcome before it takes place.

7. Proving involves actual manipulation and sensory investigation to "test" a child's prediction. If this prediction or guess is correct, the new information can be classified and stored by the child. If, however, the outcome differs from the child's expectation, he will need more time and further opportunity to repeat the activity in order to answer the new questions the unexpected outcome raised.

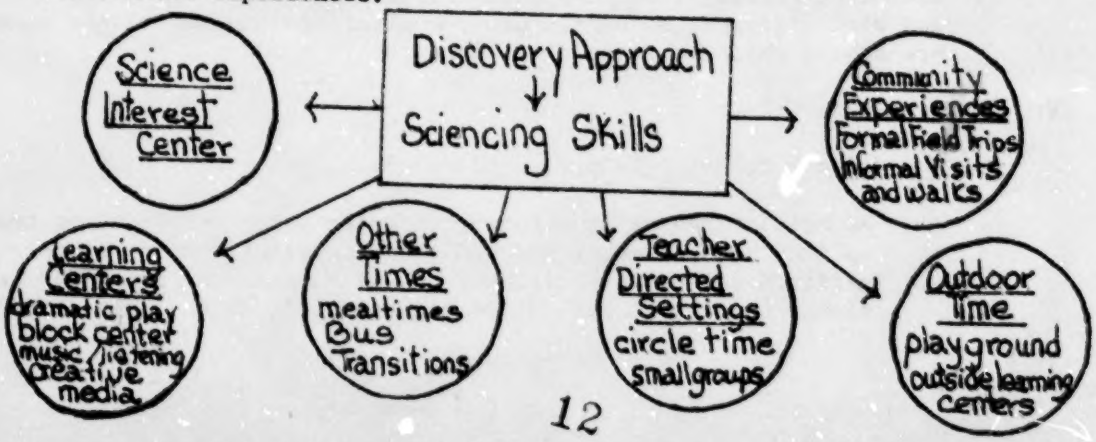
II. Ways in Which Science Experiences are Initiated and Integrated in the Classroom.

A. Teacher initiated experiences are planned activities in which the teacher hopes to stimulate the child's curiosity and help him to explore a specific topic. The settings for teacher-initiated experiences include small groups, large group at circle time, the community or the outdoor areas.

B. Child-initiated experiences — things a child finds or brings or questions can lead to experiences or experiments. The various settings for child-initiated experiences include the science interest center, other learning centers, eating areas, and outdoor areas.

C. Environmentally initiated experiences — spontaneous events which come up in the course of the day and draw children and teachers into experiences and questioning. Spontanecus events may occur outside, on the bus or at learning centers.

D. The diagram below shows those areas and activities in which science experiences may take place. Teacher-initiated experiences tend to occur at either the science interest center or in small and large group settings. However, the teacher should initiate and integrate science experiences in all areas: outdoor time, learning centers, on the bus and during mealtimes. In addition, an alert teacher will take advantage of both child-initiated and spontaneous events which can lead to science experiences.



E. In all of these scheduled activities, whether the science experience is initiated by the child, teacher, or the environment, the teacher's main role is to encourage children to use sciencing skills.

III. Teacher Guidelines for Science Experiences.

A. Teachers should try out a science activity or experience before making it available to the children. In this way, the teacher can make any changes necessary to ensure a safe, workable, and rewarding experience.

B. Materials should lend themselves to manipulation and handling. Children need real materials which they can manipulate in order to observe, compare, classify, and describe.

C. Enough materials should be available to allow each child individually to investigate them.

D. Sufficient time should be provided for each child to make observations, comparisons, and classifications.

E. Use questions which invite exploration and involve the teacher as a partner in the discovery process. Children tend to feel embarrassed or inhibited by questions which seem to "test" knowledge. A better approach is one in which "let's find out together" is implied in the question.

G. As long as children show a high level of interest in the discovery process, time should be extended to allow children to repeat or vary the activity.

H. Recognize the different abilities and previous experiences between children. Individual science experiences, while fostering skills of sciencing at appropriate developmental levels, should be geared for what each child is ready to learn.

I. While teachers should avoid emphasizing the collecting of facts and concepts as the end-product, there is a need to evaluate the kinds of information the children are acquiring. If a child has gained less from an experience or activity than he may be capable of, then the teacher may want to encourage the child to repeat the activity; at another time, simplify the experience for the child and/or plan related, indirect activities in other curriculum areas.

J. Integrating science into all curriculum areas and all parts of the daily schedule helps a child to continue dealing with the same concepts in different settings. Multiple experiences within various settings, contexts, and with different materials provide alternate and additional ways for pre-school children to acquire concepts.

IV. Environmental Set-Up

A. The Science Center - Purposes and Values

1. The science center is a resource center where children and teachers can find and use materials and tools in either child- or teacher-initiated science experiences. These experiences can occur at the science center but are not restricted to it as the only setting.

2. The activities which are offered to children at the science center emphasize the use of sciencing skills.

3. These activities and materials should allow for individual differences in learning styles and rates. Children who differ in their sciencing abilities should find challenge and satisfaction in their individual science experiences.

4. The science center can serve to highlight a certain concept or aspect of the child's physical world. It helps the child to focus his investigations more clearly on the content area.

5. The teacher can also use the science center to draw together small groups of children so they may explore, share and aid one another's discovery with the materials. Children working together may soon realize that there is more than one correct approach to a problem and more than one solution.

6. Involving children in providing and maintaining science materials (i.e. growing plants, caring for animals, collecting nature objects, sharing books from home) helps them to share responsibility with their peers in influencing and shaping their environment.

B. The Teacher's Role in the Science Center

1. Providing an area for the science center.

   a. Locating your science center in a quiet area, out of the flow of traffic, may minimize unnecessary interruptions or distractions to the children working there. However, children may feel more comfortable with a science center which is located in a more active area of the room. You may want to experiment with the best location for your particular group of children.

   b. In locating your science center consider the need for the following: Nearness to storage shelves, bulletin boards, electrical outlets and windows for natural lighting. Consider as well the possibility of using nearby tables or rug areas for extending science activities.

   c. The size of the science center will vary to accommodate the amount and kinds of materials used and the number of children who will use the center at one time.

2. Drawing Attention to the Science Center

   a. Vary the physical setting of the science center. Avoid dependency on tables and shelves as working and display areas. Experiment with novel ideas: A science cave made from a large appliance carton; a science tent using a real tent, parachute or blanket-covered table; a science booth or store (from an upright large carton). These enclosed settings may necessitate additional light sources which can be provided by battery-operated lamps. This novel lighting will further serve to attract children to the area.

b. Use mobiles and dropped ceiling effects for attention grabbers as well as for concept reinforcement. Make use of wall space and bulletin boards for posters, magazine pictures, charts and other visual aids. Photos displayed in this area of the children at work promote positive feelings as well as encouraging others to participate.

c. Other ideas for attracting children may include supplying white lab coats for children to wear; playing tapes or records of sounds and songs relating to the area of study (e.g. ocean noises, bird calls and songs about the body); pocket-style shoe bags for holding tools, sorting objects and/or storing collection cans.

3. The Teacher Creates the Climate

a. When a teacher shows enthusiasm for discovery and curiosity about the world, s/he sparks the children's interest and invites active exploration.

b. A teacher who is involved at the science center will soon find that s/he will be joined by curious on-lookers. These children can be directed into individual or group science investigations.

c. Encouraging children to verbalize their observations and ideas as well as asking open-ended questions will help children to use their sciencing skills while reinforcing their participation. The right amount of interaction, which may vary from child to child, will communicate the teacher's respect for the child's process of discovery.

C. Materials and Equipment

1. The science center draws from the surrounding environment which is a major source of materials. Science materials do not need to be expensive; they do need thought, effort and willingness on the part of the teacher to find them and organize them into the science center.

2. Some of these materials will be a permanently available collection of tools which can be used by the children to observe, sort and store objects.

3. Here is a list of recommended items for your permanent collection:

a. Magnifying glass.

b. Containers for sorting and classifying.

c. Individual collection containers.

d. Rulers.

e. Balance scales.

f. Plants.

g. Animals.

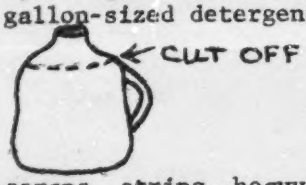
h. Magnets.

4. Teachers may want to add other items to the list. Because certain items may not be readily available, an alternate list of inexpensive substitutes are suggested below:

   a. A supply of plastic magnifying glasses obtainable from a 5 and 10¢ Store.

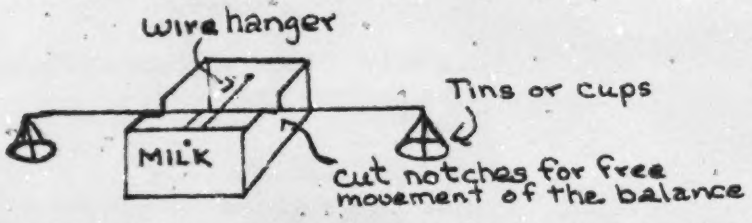
   b. Egg cartons, donated muffin tins, styrofoam meat trays, plastic berry baskets, plastic compartmentalized trays like those used for spools or fishing tackle.

   c. Coffee cans with lids, Pringle containers, margarine tubs, large milk cartons, gallon-sized detergent bottles cut open.



   d. Straight-edged wood scraps, string, heavy cardboard.

   e. A balance made of 3 pie tins or paper cups suspended from a balsa wood strip. Lie this across a milk carton (cut open lengthwise) with a straight peice of wire hanger as the fulcrum.



   f. Take cuttings from plants. Root and plant them. Beans, seeds, and discarded pits from fruits and vegetables are inexpensive sources of attractive plants. Many vegetables themselves will sprout roots and leaves (onions, carrots, pineapples, potatoes).

   g. Secure pets on loan or permanently from staff, parents, neighbors and on children's collection walks. Carefully choose pets that are easily cared for and will not be a health or sanitary problem. Fish, insects, garden snakes, earthworms, small rodents, lizards, rabbits and hermit crabs are reasonable additions to the science center.

5. Most of the materials will be organized into concept units (e.g. about Air, Gravity, Electricity, Machines, etc.) designed for individual exploration. These science concept themes are temporary and the materials will be used as long as the children's interest remains high.

6. A science concept can be investigated at the science center with discovery boxes, learning activities and games and children's audio-visual references.

a. Discovery boxes are resource boxes which contain collections of related items and specimens and/or mini-science experiments. They are prepared in advance and can be easily stored until needed. The contents of some sample discovery boxes might include:

A MINI-EXPERIMENT

MAGNETISM

2 sorting trays
a collection of objects
a couple of magnets

A COLLECTION OF ITEMS

Various types of wood
(drift wood, petrified,
cedar, hickory, pine)
Magnifying glass
Sorting trays

- If individual magnifying glasses and sorting trays cannot be provided with each collection box, then it is necessary to have them permanently available in the science center.

- Suitable storage containers for discovery boxes may be: Plastic boxes, shoeboxes, hosier or bulk stationary boxes, Ziplok plastic bags, or cigar boxes.

- Several discovery boxes provide a variety of individualized experiences in one concept area.

b. Learning games and activities can either be commercially made, or more often teacher-made. The latter usually has the advantage of being more adaptable to the children's particular needs. Some examples are:

- Matching pictures to real objects.

- Lotto games.

- Weight, sound, and smelling jars.

- puzzles.

c. Audio-visual resources include children's books, records, tapes, picture collections charts, language masters and view masters.

NOTE: See - Supplement #2 - Inventory of Materials and Equipment and Supplement #3 - Discovery Box Ideas.

V. Other Environmental Settings

Sciencing experiences occur in settings other than the science center— outdoors, in the community, at other learning centers, during meal times, in transitions during the day. In all of these, science experiences can either be spontaneously initiated by the environment, planned for by the teacher, or result from the children's own interests. Teacher techniques and guidelines for fostering the discovery process, as outlined in Section III. should be applied to all those settings where science is experienced. Materials, tools and resources located in the science center may also be used during different times of the day and in various settings.

A. The OUTDOORS is an exciting and useful setting for science experiences. Any science activity, with few exceptions, can be done either indoors, or outdoors. Where to do an activity-- indoors or outdoors, or in both environments-- may depend on your physical facilities, the weather, your science project's goals, and/or your children's individual learning styles. Integrate the outdoors frequently with the total science program. If you are lucky to have a large and varied outdoors, with good equipment and plenty of grass, trees and open spaces, more of the following ideas will be usable to you:

1. Use outdoor areas for long-term science projects that are difficult, if not impossible, to do inside — gardening, large-scale construction, raising animals.

2. Give the indoor activities a new outdoor perspective — will a magnet attract to the monkey bars? To the sand?

3. Take a closer look at a science item in natural (and usually better) lighting— how does a jar of colored water look? Bubbles?

4. Make nature studies in the "field setting". Observe insects and birds in their home surroundings. Compare colors, smells, textures and shapes of flowers and leaves. Take a close look with a magnifying glass and sort by <u>like</u> and <u>different</u> properties using sorting trays.

5. Repeat activities or events done indoors, outdoors - take out some discovery boxes, read the thermometer, measure childen's heights and weights. Repetition is important to young learners, and children are provided with the opportunity to test whether the setting will affect certain characteristics of objects and living things.

6. Study simple physics - children can experience through body movements concepts of energy, motion, friction, work, ease, pace and rate, space and direction, gravity and balance

7. Study ecology - Water and air polution, "Keeping America Beautiful", recycling cans, glass and paper.

B. The COMMUNITY and its resources present children with additional experiences in the science concept being investigated at school.

1. Short excursions into the immediate neighborhood as well as pre-arranged field trips provide children with additional opportunities to observe and associate those concepts they have been exploring at school.

2. Materials collected on nature walks can be brought back to school to be handled and explored.

3. Resource people such as parents can work with small groups of children in cooking experiences or starting vegetable or flower gardens, or they may loan or donate animals and plants to the classroom

4. A field trip or spontaneous excursion can also spark an interest in the children and provide a starting point for a new area of study in the world of science.

C. Other integrated settings

1. Learning centers can serve two purposes related to sciencing in the classroom:

   a. First, their materials and activities can stimulate child-initiated science experences. For example, a child who is experimenting in the block area with ramps, planks and vehicles is exploring the concepts of simple machinery and gravity. An alert teacher will provide further opportunities and materials for the child to continue his investigations.

   b. Second, learning centers can offer activities which extend concepts into new settings. For example, air is being studied at the science center with various discovery boxes and learning activities. Providing wind instruments (whistles, harmonicas, flutes, recorders, etc.) at the music center can extend the children's understanding of air.

2. Mealtimes, because they focus on food experiences, lend themselves to the observation and description of various science concepts: the senses (how foods taste, smell, feel, look and sound); changes (before and after cooking); temperature (foods that are hot and cold); nutrition and health (the four food groups); where food comes from (from seeds, animals, etc.). In addition, meals are convenient times when small groups of children are drawn together and discussions and conversations can flow in a relaxed atmosphere.

   a. Centerpiece arrangements may include one or several objects that stimulate discussion and encourage comparisons (e.g. a bowl of peanuts in the shell to be opened, tasted and compared to the children's lunch of peanut butter sandwiches). Centerpieces may consist of a collection of objects — things that are round; items made from wood; various sizes of pine cones.

   b. Mealtime games can help to integrate a particular concept into this setting:

      - A science-related object can be hidden under one plate at each table. The "owner" of the plate can start a discussion about it at his table.

      - Magnetic letters can be used to represent name initials and to indicate place settings. Children have to find their initials before sitting down.

- A child can be blindfolded before tasting and guessing a certain dessert and fruits.

c. Environment-initiated happenings can be sources for additional science experiences. For example, if a glass of juice spills, a child can be given a piece of paper towelling, and a piece of wax paper to wipe the spill. The child's observations might spark further investigation with other materials which are provided in the science center.

3. Transitions — throughout the day, children and adults make transitions and change the ongoing activity — joining and separating for circle time, small groups and meals; cleaning up after option time and eating; and bathrooming. Science can enter into these routines and make them smoother, more enjoyable and educational.

a. A song or game relating to the science area of study can bring a large group activity to an end and move children individually or in small groups to the next activity. Some examples are:

- Child slides down a ramp (physics).

- Child dramatizes an animal which classmates have to guess.

- Child identifies himself when the song describes him — "I see a boy with red sneakers on, red sneakers on, red sneakers on. I see a boy with red sneakers on and he may go to lunch". (colors).

b. During washing and bathrooming, children may pose questions that can initiate a science activity in health, the human body, or properties of water.

4. The Bus or Van — teachers who ride with children to school or back home on the center's van or bus have the chance to illustrate concepts such as wheels, machines, transportation, weather, etc.. If all the children don't ride the bus, these concepts can be discussed while taking the children on a field trip.

5. Teacher-directed settings.

a. Large group and circle time settings are suitable for songs, games and discussions relating to the science area being explored. Rules and guidelines for using certain science materials and equipment and for carrying out activities can be cooperatively established.

b. Small groups lend themselves to more structured science experiments which may require closer supervision and teacher direction. The teacher can informally evaluate different levels of sciencing ability and individualize the experience accordingly.

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SUPPLEMENT

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SUPPLEMENT #1 - ACTIVITY 1A

Identify the teacher and child situations with one or more of the skills listed below:

OBSERVING

QUESTIONING

CLASSIFYING (MATCHING, SORTING)

COMPARING

DESCRIBING

PREDICTING

PROVING

1. At the science center, Linda opens up a discovery box, looks inside and takes out a closed plastic bottle. She shakes the bottle and listens to the sound it makes.

2. Jack collects fallen leaves from the playground and sits down to put the rounded ones in one pile and the pointed ones in another.

3. While riding the bus to school, Yvonne points up to a helicopter and exlaims, "Look, its gonna land!"

4. Beth decides she can build a tower of 10 blocks without it falling. She counts and takes 10 blocks from the shelves and succeeds in balancing one on top of the other.

5. A small group is making breakfast; Carl looks at the pancakes and says, "They look like frisbees!"

6. At the sandtable, Ralph is filling a can with sand and doesn't understand why he cannot keep the can full. He repeats the activity several times and finally discovers a hole on the bottom of the can.

7. Outside, while Kara is pumping herslf on the swing, she makes up a little song: "Pump, pump, pump - the harder I pump the higher I go!"

8. At the science table Felice is using a bicycle pump to inflate a beach ball. The teacher comes over and asks, "What is happening to your ball?" Felice answers, "I'm making it fat with air." The teacher responds, "Oh, you're inflating the ball" and Felice smiles and says, "Yes, I'm inflating the ball."

9. At circle time the teacher shows the class a flashlight and batteries. She asks, "How can we make the flashlight work?" Robert says, "Maybe if we put in those things" (he points to the batteries). Robert walks over to the teacher and puts in the batteries. He turns on the flashlight and exclaims, "The flashlight works now!"

SUPPLEMENT #1 - ACTIVITY 1B

From the list below, find 9 activities which provide manipulative experiences:

1. Field trip to collect rocks.
2. Containers and rocks for children to sort and classify in ways of their own choosing.
3. Teacher displays rocks, naming them as each is shown to children.
4. Children scratch various rocks to see which ones are hard and soft.
5. Set of rocks glued in box and covered with clear plastic to keep children from pulling them off.
6. Mineral book which teacher shows children as s/he names rocks.
7. Pictures of rocks and real ones for children to match up.
8. Sandstone and hard objects for children to rub and make sand.
9. Books brought in by children from home to go on science table and to be handled by children.
10. Teacher discusses how fossils are made.
11. Rocks and fossils and a magnifying glass for children to use.
12. Children make their own fossils from hardening clay.
13. Teacher tells children the difference between wood and petrified wood.
14. Basket of wood and petrified wood to be felt and sorted.

SUPPLEMENT #1 - ACTIVITY 1C

Which of the following questions and statements invite children to explore and experiment? (Choose 4)

1. "Who knows what happens when we mix vinegar and soda?"

2. "I wonder what will happen if we mix vinegar and soda?"

3. "What do you think will happen if we mix the vinegar and soda?"

4. "Let me show you how the vinegar and baking soda make foam."

5. "Can you think of other liquids you could try adding to the soda?"

6. "What happened when you added the water?"

SUPPLEMENT #1 - ACTIVITY 1D

Write next to the statement, TRUE or FALSE. Discuss your answers with your Advisor.

_____ 1. After the teacher reads the books, Rocks All Around Us, to the children, s/he is right to assume that the children have learned some facts about rocks.

_____ 2. Children can more fully explore the science center's materials when they have enough time to use all their senses and apply their sciencing skills.

_____ 3. It is more important that children learn the facts than become involved in the process of sciencing.

_____ 4. Teacher demonstration with science materials is a vital technique for teaching young children.

_____ 5. Dramatic playing, songs, records, creative media, outdoor play and time spent on the bus should all be integrated into a child's discovery of the science in his world.

_____ 6. The teacher should avoid asking questions to children that can be answered with a "yes" or "no".

_____ 7. Sciencing is a process that only smart children can do well.

_____ 8. Children should have science materials of their own, with which they can perform their own experiemnts.

_____ 9. Child- and environment-initiated sciencing experiences need only be recognized and extended by the teacher when they fit into s/his lessons plans.

_____ 10. If the science center is not used by the children, the teacher is right to assume they have no interest in sciencing.

_____ 11. A teacher should avoid providing experiences for children on electricity, gravity and machines if s/he doesn't have a thorough knowledge of how they work.

_____ 12. The science center is primarily a display table where the children will spend time mostly looking at objects placed there.

_____ 13. Other learning centers and transition experiences need not relate at all to the science topic being studied.

_____ 14. Discovery boxes allow individualization in the science center, and may also be used outdoors.

_____ 15. Teachers can expect boys to have greater interest and better abilities in sciencing than girls.

_____ 16. If magnifying glasses, sorting trays and balance scales are used frequently, they should be permanent tools, always available to the children.

_____ 17. Magnetism, static electricity and air are science areas which young children cannot understand at all.

_____ 18. Isolated experiments and experiences with various science concepts help children to get a general and broad understanding of the world around them.

_____ 19. Young children are not capable of doing science experiments on their own without the teacher's guidance.

_____ 20. "Let's find out about that insect you found." is a good way for the teacher to invite a child to investigate further.

SUPPLEMENT #2

INVENTORY OF MATERIALS AND EQUIPMENT

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SUPPLEMENT #2 - INVENTORY OF MATERIALS AND EQUIPMENT

TABLE 1. EQUIPMENT AND MATERIALS TO FACILITATE SCIENCE EXPERIENCES

SMALL, GENERAL EQUIPMENT

Mirrors — framed or encased portable, — full-length wall size, preferably movable

Mignifying glass — sturdy frame, good lens, protective case

Lighted Magnifier

Flashlight

Magnets — varying strengths, horseshoe and bar types

Compass — magnetic type, in case or with lid

Pocket knife (teacher only) with screwdriver and corkscrew attachments

Scissors — blunt (larger pointed scissors for the teacher only)

Tongs, tweezers, forceps

Rockpick (also called geology hammer)

Tools — screwdrivers, hammer, pliers, level, saw, tin snips, etc.

Plumber's Grabber — for planting bottle terrarium, cleaning drains, extracting small samples for study

Safety goggles — child size, several pair

Asbestos hot mats or space for setting hot things

Basins and tubs, washpans

Plastic containers with lids, many sizes

Bottles, plastic, assorted, with lids

Pots, pans, trays, muffin tins

Bowls and cups, plastic or metal

Assorted sieves, sifters, and funnels

Spatulas, metal and rubber

Eggbeater, wire whip

Eye droppers

Tongue depressor blades, popsicle sticks

Backpack or shoulder strap kit bag

Air pump — bicycle, bellows-type, and/or camping pump

Mortar and pestle

Kitchen baster, ear syringe, other suction devices

MEASUREMENT EQUIPMENT

Thermometers — metric (reading centigrade or Celsius), or metric-Fahrenheit combination; and maybe an indoor-outdoor set; a wet bulb/dry bulb hygrometer; cooking therometers: meat, candy, oven types

Meter sticks and rulers

Metric tape measure

Metric bow calipers

Metric volume capacity measures

Metric weight set

Scales — balance type; kitchen type; bathroom type or human platform scale if available; hanging type for small items (postage scales)

Cooking measures — spoon sets, cup sets

Clock, preferably with second hand

Timing devices — kitchen or laboratory timer(s) to measure seconds, minutes; and maybe a stopwatch, a sand hourglass, or an egg timer

VERY SPECIAL EQUIPMENT (Can be borrowed as needed, much is for older children or adult use)

Binoculars

Telescope

Microscope

Periscope

Camera, especially Land-type, or "Polaroid" for children's use (sparingly)

Tape recorder

Record player

Radio

Dissecting kit

Portable green house

Vacuum cleaner, tank type preferred

Ice cream freezer (crank type)

Food grinder

ANIMAL EQUIPMENT

Cages, boxes, tubs

Food dishes, water bottles, exercisers, etc., for rodents

Aquarium, filter pump, light (may also need thermostat and heater)

Small fish net

Insect cages or jars

Insect net

Terrarium — large jars or tanks, screen for tops of animal terrarium, container for water pool, gravel, charcoal, soil

Assorted glass or plastic jars, lids

Bird houses

Bird feeding station; hummingbird feeder if appropriate

Appropriate food, watering, bedding, nesting, sheltering, and tunneling materials

GARDEN AND PLANT EQUIPMENT

Flat boxes, tubs, or trays

Plant pots, boxes, egg cartons

Saucer, lids, small flat trays

Hand tools — trowel, fork cultivator

Large tools — spades, hoes, rakes, etc.

Growing bulb lights and fixtures

Watering cans

Outdoor hose

Fencing if necessary, or large truck tires, etc., as enclosures

GENERAL MATERIALS

Paper and notebooks

Pencils

Wax pencils

Gummed lables

Plastic and paper bags

Paper rolls and spools

Carboard tubes, carpet rolls

Newspapers

Tape — masking and cellophane

Assorted corks, plugs, stoppers, lids

Clamps, clips, clothespins, paper clips

Rubber bands, wide assortment

String, yarn, fishline, heavy and light

Kite string

Thread

Rope

Assorted springs

Wire, assorted weights, some insulated

Pipe cleaners, bag twist wires

Nails, tacks, screws, bolts, nuts

Hooks and screw eyes

Washers, assorted, rubber and metal

Steel wool

Sandpaper

Toothpicks

Drinking straws, paper and/or plastic

Plastic tubing

Wax — paraffin, bees, or candle

Household machine oil

Blotting paper

Filter paper; coffee filters

Wax paper, plastic wrap, aluminum foil

Foam rubber sheeting scraps

Sponges

Cotton balls and batting

Nylon net yardage

Cheesecloth

Planks and boards

Assorted paper products — cardboard boxes, carboard sheets, filler material

Wood or substitute — pegboard scraps, Masonite and Formica or other plasticized surface boards, sawdust, cedar chips, driftwood, aged wood

Cooking staples — sugar, flour or cornstarch, cooking oil, salt, vinegar, soda, gelatin, etc.

Cleaning supplies — ammonia, bleach, detergent, etc. (for adult use only)

SPECIMENS AND RAINY DAY SUBJECTS

Stethoscope

Kaleidoscopes, scanoscopes

Locks and keys

Suction cup fasteners

Magnetic fasteners

Latches and knobs

Gears and geared devices

Clocks (to be taken apart)

Switches, bulbs, batteries

Pulley and wheels

Lever devices

Ball bearings

"Slinky" toy

Scraps of brass, iron, copper, tin, aluminum, etc.

Color paddles, transparent color paper, gels, etc.

Sunglasses with various colored lenses

Prisms

Balloons, inner tubes, inflatable pillows, etc.

Pinwheels or windmills

Weather vane

Wind sock arrangement

Fossils

Rocks and pebbles, rough and smoothe — many varieties, local samples

Concrete, asphalt, gravel

Soil samples — clay, sand, loam

Shells — fish, sea and fresh water, expecially local

Real cork and real sponge samples

Seaweed, etc., if possible

Mosses, lichens — local if possible

Shells — birds' eggs, insects, nuts, etc.

Feathers, assorted

Fur pieces, assorted

Wool samples, especially raw wool of assorted colors, preferably uncarded

Leather pieces — pig, cattle, sheep, deer, elk, moose, etc.; assorted tannings, sueded and smooth, thick and thin, flat and thong, also assortment of garments, accessories

Cotton bolls

Raw flax

Nests

Seed pods

Conifer cones and sample of needles

Seeds, great variety

Gourds, pumpkin, variety of squash

Bones — assorted, fish, chicken, other animal

Horns and antlers

Natural fiber fabrics — woolens, cottons, linen — variety of weaves and textures

Synthetic fabrics — nylon, rayon, polyester and acrylics - variety of weaves, knits, textures, weights, etc.

Dried plants — flowers, grasses, herbs, etc.

Dried fruits and vegetables — apricots, peachers, pears, prunes, apples, raisins, peas, beans, lentils, etc.

Whole grains — wheat, oats, rye, rice, corn, etc.

Edible seeds — sunflower, seasame, poppy, caraway, flax, etc.

Edible nuts, in the shells — walnuts, pecans, peanuts, filberts, etc.

Startwith an inventory. It actually serves the purpose of reminding you of what you already have and inspires you to think of ways to be sure children get a chance to use it. Special equipment, such as a microscope, camera, or stop-watch can be borrowed for a day or two.

SUPPLEMENT #3 - IDEAS FOR DISCOVERY BOXES

AIR:

1. Box with materials to be immersed in a tub of water. Try sponges, dry soil, cardboard, small can with hole in bottom. Bubbles will not emerge from some materials but will remain trapped on their surfaces.

2. Box with a bicycle pump and beach balls, pool floats, bicycle inner tubes.

3. Box with a plastic sandwich bag (not fold-top kind), whose opening is gathered around a drinking straw and secured with masking tape. Supply wire closures if child wants to save the air he has blown into the bag. Include some balloons too.

4. Box with flying and wind blown objects — a glider, kite, a small parachute from a 12" square of light fabric with a spool for weight, a pinwheel. Provide large open spaces for children to experiment.

WATER:

5. Box with eye droppers and paper cup (to be filled with water). Have various pieces of material to check for absorption: newsprint, glossy finger paint paper, aluminum foil, waxed paper, sponge, terrycloth, paper toweling, fabric, etc. Use plastic tray to work on.

6. Box with small plastic tub (to be filled with water) and various materials to check for floating: rocks, wood, paper, styrofoam, sponges, metal, plastic, ping pong balls, golf ball.

7. Box with a muffin pan or plastic ice cube tray with separated molds. Each compartment can have a little sample of dry material (salt, sand, cornstarch, flour, sugar, seeds, fine gravel, etc.). From a small cup child pours a little water into each ingredient and stirs. Child explores which things disolve in water.

8. Box with tub (to be filled with water) and a small (medicine bottle size) container with dish soap (Ivory works best) and 1/2 tsp. of sugar mixed together (sugar makes bubbles last). Soapy bubble-makers: paper cup with a hole in bottom, a straw, a bubble wand, a 6-pack plastic lid, a soft plastic funnel, etc. A terrycloth towel in the box makes for easy cleaning.

MAGNETS: (See Supplement #4 — Sample Science Unit Lesson Plans — also)

9. Box with small, clear-plastic medicine bottles with tops tightly taped. Half-fill each bottle with one of the following: iron filings (or steel wool), black pepper, small plastic clips, sand, pins, etc. Encourage child to move magnet along length of bottle and observe.

GRAVITY:

10. Box with small objects to weigh: washers, bottle caps, small wood cubes, cotton balls, etc. Use contents of box with science center's balance scale.

11. Shoe box with holes placed in lid: . Prop (using a block) a tray on side of box, tape, creating a slide effect. Use marbles for rolling down ramp into holes.

MACHINES:

12. Box containing, round, wheel-like objects and non-wheel-like objects, (eg. beads, spools, toilet tubes, car wheels, coins, paper cone, cubes, ruler, hair roller, pencils, a matchbox, a spoon, a rectangular plastic bottle, a milk carton (empty), etc.) Let child explore properties of objects. Two cardboard cartons with "yes" and "no" marked can be used for classifying rollers and non-rollers.

13. Box with simple machines to take apart and put together. Include tools needed for dissassembling and assembling, if needed. Supply small take-apart vehicles, gear boxes, old radios, clocks, etc.

14. Box with plumber's equipment: real sets of pipes (elbows, nipples, T's faucets with adapter couplings, and a variety of pipelengths) for children to fit together. Include a wrench, and some vaseline for lubrication.

SOUND:

15. Place in a box a number of small objects found in the room such as crayons, paper clips, seed, small toy car, small blocks. Place an identical matching mate to each object inside its own tin can with an opague plastic lid. Child will try to match sound made by object in can to the matching object outside of can.

16. In a box put an assortment of thick and thin, long and short rubber bands. Include various small boxes, a milk carton, a plastic butter tub, and some larger container, etc. around which rubber bands can be stretched. What kind of sound does each rubber band make?

17. Box of different shaped and sounding bells with ranges from high to low.

18. Box with some objects that can be used to make sounds:

Egg beater	whisk broom	crisp paper
tone block and mallet	comb	cotton ball
tuning fork	seashell	castanet
triangle and striker	coconut shell	tissue
feather	alarm clock	kazoo

Encourage comparing of sounds and how they are made by dropping, striking, tearing, crumbling, etc.

19. Box with a stethoscope, soft-ticking watch, loud ticking alarm clock.

20. Box with different types of tubing: 12" piece of garden hose, aquarium clear tubing, golf club cover tubes, paper toweling tubes. Encourage making sounds through the tubes.

LIGHT AND COLOR:

21. Box with toys or objects which are red, yellow or blue, three sheets of construction paper — red, yellow, blue, to place on table. Child can sort toys by color and group them on appropriate paper.

22. Box with 3 color pattern cards:

eg. 1) red-yellow-blue-green-orange-purple

2) red-yellow-red-yellow-red-yellow

3) red-blue-yellow-red-blue-yellow

Cut-out colored square (or sample-color chips from a paint store) for child to match patterns.

23. Box containing red, yellow, and blue food coloring (small size with plastic, cone-shaped top). Three small plastic bottles to be filled with water. Let child experiment with mixing colors. An eye dropper and paper toweling can be provided for the child to make color combinations on paper.

24. Box with lid that has small oval opening cut out on one end. Attach with paper clip at other end, a colored square of construction paper. Keep box with lid on science table. Change color daily. Children will explore box and may discover that they cannot tell the color of the paper without opening the box; light is necessary to see color.

25. Box with a blanket and a flashlight. Include other objects to see what light will or will not shine through (waxed paper, cardboard, clear jar with, and without water, colored tissue paper, clear vinyl folder, a blindfold).

26. Box with small piece of thick plate glass or plastic with edges taped, prisms, or chandelier drops, small clear plastic boxes. Some glasses and plastics bend light into rainbows. Strong sunlight is needed or a projector light. Water in small plastic boxes, when taken outdoors on a sunny day create spectrums through the corners.

ELECTRICITY — STATIC AND CURRENT

27. Box containing a clear, flat plastic box with small rice-sized bits of tissue paper inside. Rub box top with a bit of fabric (wool, fur, silk, nylon) very fast. Paper bits will move around.

28. Box with small, long balloons (blown up, preferably) and styrofoam meat trays. Include wool, silk, or fur fabric to build up a charge on both the balloons and trays. They'll stick to the wall.

29. Box with materials to form a circuit: #6 dry cell (1½ volts), insulated copper wire, 1½ volt light bulb, 1½ volt socket, and a small screw-driver. Children can make a complete loop for an electric current. (Prepare wire into 2 pieces, 12" long each. Cut and peel off ½" of insulation from each end of

wire.) May show children how to set up a simple circuit, with an example of a finished circuit and a chart on "how to".

ROCKS AND MINERALS:

30. Box containing a small bucketful of #67 washed gravel (range from almond to egg size), purchased from a builder's supply store. Provide a tub (to be filled with water), a terry cloth towel and sponge to soak up excess spills, and a plastic smock for the child. Child will enjoy looking at rocks and washing them, noting changes.

31. Box with bucket of #67 washed gravel and sorting containers. Children can sort and classify rocks.

32. Box with #67 washed gravel, blackboard chalk and pumice (only a couple of samples of each are needed). Supply 3 sorting trays with a label "soft" on one, "hard" on another. Trays are lined up in positions:

leaving middle tray unlabeled. Child scratches rocks with a fingernail, and a penny. Soft rocks are scratched by a finger nail; hard rocks can't be scratched with a penny but medium rocks can.

33. Box with several tin cans with lids and pieces of soft, crumbly-looking rock (shale, soft sandstone). Child shakes rocks in can and inspects changes in rocks. Supply a magnifying glass, and a tray to dump tin can contents on.

34. Box with soft-assorted rocks. Use box outside as child can draw with rocks on pavement. Slate blackboard can also be drawn on indoors. Supply one in discovery box.

35. Box with rocks, (assorted), an old heavy cloth, and a hammer. Work on sidewalk; cover rock with cloth and strike rocks with hammer. Examine insides of rocks, comparing with outside appearence.

36. Box with tub of top soil, sieve, magnifying glass, 2 cups and water. Sieve through top soil and inspect with magnifying glass. Soil in cups with a bit of water stirred in provides another exploring experience.

PLANTS

37. Box with collection of various seeds (from fruits) different shapes, sizes, colors, to be used with sorting trays.

38. Box with locally available seeds from: garden plants; weeds (teasle, milkweed, burdock); grasses (wheat, oats); and trees (Ailanthus, locust, oak, pine, chestnut). Include old fuzzy mittens and a sock, sorting trays, magnifying glass. Encourage child to shake seeds from pods, brush hairy seeds against the mitten, beat seed spikes against trays to release grains and take a close look at burrs and hairy seeds with a magnifying glass.

39. Box with tray of sand (to be dampened slightly), a collection of twigs, pinecones of different sizes, dried grasses and pods, some wild flowers, small toy animals and people. Child can arrange items into small landscapes.

ANIMALS:

40. Box with pictures of familiar animals, two trays, shells of any sort and chicken bone. Children identify shells as outside coverings, and bones as inside. Classify animal pictures into the two groups.

41. Box with equipment to dig for earthworms (pail and shovel) and materials to keep earthworms in (mixture of peat moss and soil dampened with water, plastic shoebox, oatmeal or coffee grounds (food), nylon net to cover top of box, fasten with large rubber band).

HUMAN BODY

42. Box with a set of various objects from the classroom that have a distinct odor: glue, soap, fish food, pencils, paint. Child will compare and match odors. May include a blindfold.

43. Box with plastic pill bottles with lids that have small holes. Have several materials with distinct smells, each wrapped loosely in aluminum foil (banana, lemon, cheese, soap, peppermint, coffee, orange). Place in bottles. Mounted pictures of the items will be used to match to the correct odor.

44. Box with small containers, each filled with one of the following white items: powdered sugar, granulated sugar, flour, salt, constarch and baking soda. Child can observe likeness of pairs but will use sense of taste to describe the differences.

45. Box with a 3½" opening for child to put hand inside. Attach a piece of cloth over the opening, inside the box, so child cannot see into interior. Place inside, toothbrush, toothpaste, comb, brush, washcloth, bar of soap, emery board, hand mirror.

46. Box containing a magnifying glass and facial mirror for exploring own body.

47. Box containing make-up kit for one child. Include cold cream and tissues for clean-up.

FOOD

48. Box with plastic fruits and vegetable; magazine pictures for each.

49. Box containing plastic fork, knife, spoon, glass, paper plate, and napkin; place mat with outline of each. Child can "set the table". Pictures of food can also be added to box to place on a plate.

50. Box with variety of empty food boxes and cans with labels.

51. Box with goose, duck, chicken and pullet eggs (blown) with corresponding feathers for children to identify, match and compare.

Date : one week
Area of Emphasis : Magnetism & Magnets

Schedule	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	LOCATION
Arrival + Free Choice 8:30-9:00	Science Table open with discovery boxes → through out week					
Breakfast 9:00-9:30	* Magnetic Letters (1st initial of child's name) attached to fork or spoon at each child's place setting *					Tables
Large Group 9:30-9:50	songs →	→	→	→	→	Rug Area
	Story w/ Props - "How the Magnet Saved the Day"	Flannel bd. story - The Shepherd & the Lodestone	STORY : Mickey's Magnet Branley	STORY : Magnets - Muller	Discuss properties of magnets - with props	
Transition to Learning Centers :	Magnetic Grab Bag.	"London Bridge"	"One Little Magnet" - song	"Jack Be Nimble"	Magnetic Fishing make	
Option Time - Self-selected activities 9:50-10:50	- Magnetic Field Pictures - Fuzzy Face Jonkers - Fishing for Bodies (use rocking boat, poles (w/magnets + body pictures)	- Junk Sculptures of iron + steel - Open Choice (c.m.) - Toy Crane w/ Magnetic Lift (use iron + steel objects)	- Magnetic Puppets - Decorate Shoebox Stages - Open (stress "I can" feeling in building)	- Magnetic Field Pictures - Open choice (c.m.) - Toy Crane w/ Magnetic Lift. (use metal cars to tow	- Magnet boats - provide water for sailing. - Open choice (c.m.) - Fishing for Bodies	• Creative Media (c.m.) • Block area • Dramatic Play
	←	- Magnetic Objects for House (entire wk.)	→	→	→	
	- Counting paper clips (how many can your magnet hold?)	- Create a Funny Face - magnet w/iron filings	- Counting paper clips (how many can your magnet hold?)	- Buzzer Game - mag. sorting w/pictures	- Buzzer Game - magnet sorting w/pictures	• Cognitive Center
	- Tracking dittoes - Magnetic Tracking Game #1 & #2	- Stencils - homemade (styrofoam trays)	- Magnetic Tracking Game #1 & #2 - Magna Sticks	- Create a Funny Face - Magnet with iron filings - Tracking dittoes	- Magna Sticks - Stencils	• Manipulative Area
	- Magnet Discovery Box - sorting	- Magnet Discovery Box - sorting	- Magnet Discovery Box - magnets pull thru some materials	Magnet Discovery Box - how strong are magnets?	- Magnet Discovery Box - making a magnet	• Science Center
	- Books - available through out week.	- Lodestone (Magnetite)	→	→	→	• Books
Outdoors 10:50-11:30	Hang 'Apples' on 'Tree' with magnets.	Sand Fishing - with magnet fishing poles & paper fish.	Toy Crane for Sand box	Making pin-wheels Magnetic Numbers and Letters on Jungle Gym	Magnet boats - float in fountain	Playground
	Magnet Exploration →	→	→	→	→	
Small Groups - Teacher directed experiences 11:30-11:50	① Experiment Ⓐ Magnets are strongest at each end. ② Exp. Ⓑ - Magnets pull some things but not others	① Exp. Ⓑ ② Experiment Ⓐ	① Experiment Ⓒ - Each end of a magnet act differently ② Exp. Ⓓ Same Magnets are strong.	① Exp. Ⓓ ② Experiment Ⓒ	① Magnetic Tracking Games 1 & 2 ↕ reverse ② Make your own mag. fishing pole - to take home	Group 1 Group 2
Clean-Up and Lunch 11:50 - 12:30						

This week's lesson plans include objectives in each of the four areas of development: Social, Emotional, Cognitive, Physical (Motor). The Cognitive Objective stresses the week's area of emphasis: Magnets and Magnetism. In meeting the other 3 objectives, children use their experiences with magnets in addition to other alternative activities.

DATE: One Week

AREAS OF EMPHASIS: MAGNETS AND MAGNETISM

GENERAL OBJECTIVES:

I. Social: To encourage each child to verbalize with other children by relating a story or making a short comment about an event or activity which he was a part of.

II. Cognitive: To help the children increase their sciencing skills with magnets and magnetism.

III. Emotional: To build the child's positive self-concept by focusing on the things that he can do.

IV. Physical (motor): To provide the child with opportunities to practice tracking skills (eye-hand coordination) by following a predetermined line or pattern.

BEHAVIORAL OBJECTIVES:

I. The child will explain to another child about something which he took part in while at school at least once a day.

II. The child, by the end of the week, will have experimented with magnets in at least 5 different activities and will be able to demonstrate at least 3 of the following concepts:

- "Magnets pull somethings but not others."
- "A strong magnet can hold many things."
- "A weak magnet does not hold many things."
- "Magnets pull only steel or iron."
- "Each end of a magnet acts differently."
- "One magnet can make another magnet."
- "Magnets pull through some materials."
- "The ends of a magnet are stronger than the center."

III. The child will comment about an activity he took part in with at least one positive evaluation of what he was able to do.

IV. a. The child will engage in scissoring activities at least one time during each day of attendance. Young preschoolers will be able to hold the scissors correctly and will be able to make indiscriminant cuts. Older preschoolers will be able to follow a line and cut fairly close along it.

b. The child will be able to follow within a stencil at least 70% of the time and track a line along a designed area 60% of the time, when the latter activity's pattern is not physically confining the child's movements (as with a stencil).

ACTIVITIES:

Only those activities relating to the area of emphasis (Magnets and Magnetism will be explained.

Breakfast

Monday through Friday

Magnetic letters, using the 1st initial of each child's name will be attached to their own fork or spoon, at each child's place setting. Discussion about finding your correct seat and the magnetic letter. What else does it attach itself to?

Large Groups

Monday

Made up story about "How the Magnet Saved the Day". Use props that are familar to children — magnetic clips and hooks, magnetic potholder, magnetic key holder, magnetic paper holder, etc. Transition to Learning Centers — with fishing pole, each child will dip pole's magnet into bag and count aloud how many bottle caps he pulled out.

Tuesday

Story made into a flannel board of "The Shepherd and the Lodestone". Talk about Lodestones (magnetite) and show to children sample rock of magnetite. Demonstrate its similarities to a manufactured magnet. Let children handle.

Wednesday

Story by Branley — Mickey's Magnet. Read and talk about the story if the children are interested. Transition to Learning Centers — "One Little Magnet" — song in which you attach children to each other and pretend you are a magnet. Sing to tune of "One Little Elephant". Words — "One little magnet, went out to play, along an iron fence one day, he had such enormous fun, that he called for another magnet to come".

Thursday

Story by Miller — Magnets. Read and discuss.

Friday

Discuss properties and uses of magnets. Bring props to remind children of how we use magnets everyday. Transition to Learning Centers — Children will use magnetic fishing pole and fish for magnetic letters or numbers.

Option Time — Self-Selected Activities

Monday

Magnetic Field Pictures — Place lightweight paper over a strong magnet (horseshoe, bar-shaped, etc.). Sprinkle iron filings over paper. Design created can be sprayed with hair lacquer to make permanent.

Fishing for Bodies — Children will use fishing poles with magnet as hook. Can sit in rocking boat and fish for pictures of body parts (or any small picture) that have paper clips on them to attract the magnet. Can add sun and fishing hats, boots, pails for dramatic play props.

Magnetic Objects for House — Place into home-living area objects found in a house that are magnetic: magnetic clips and hooks, magnetic paper clip and safety pin holder (don't use pins), magnetic key holder, magnetic potholder, magnetic paper holders (also called refrigerator or note holders), etc..

Counting Paper Clips — Fill several coffee cans with paper clips. Children, using magnets, try to collect as many clips as possible, counting the amount collected with each try. Can be a contest.

Magnetic Tracking Games — 1. Large board has pathway for cars to follow. Child guides paper car (with small bar magnet attached) with another magnet from underneath board. 2. Scuba diver swimming around obstacles.

Magnet Discovery Box — Assorted magnets with various objects. Sort objects that attract to magnet on one tray and objects that don't on another tray. Free exploration.

Books — See references for children and teachers.

Tuesday

Junk Sculptures of Iron and Steel — Using magnets, children will select items to make a junk collage. Can glue to paper, or stryofoam tray; or stick items into a styrofoam block.

Toy Crane — Large wooden crane has magnet attached to lifting cable. Supply iron and steel objects to lift and transport. Children may want to use blocks too.

Create a Funny Face — Commercially-made. Add facial and decorative additions to plain face. Iron filings make designs when guided by a magnet.

Lodestone (magnetite) — Open exploration of rock. Compare to other rocks and magnets. Supply tray of sand for children to collect iron bits frequently found in river bed sand.

Wednesday

Magnetic Puppets — Children decorate wooden spools that have iron or steel tacks hammered into bottom. Can use puppets on child-made stage. Guide puppets from underneath platform with strong magnet. Can also make "puppets" from paper that has clip attached.

Magno Sticks — Commercially-made game. Children create own designs and and structures from steel shapes on a magnetic tray platform.

Magnet Discovery Box — Supply magnets, steel wool, and various materials to test with; paper, cardboard, aluminum foil, sand filled jar, tumbler of water. Child explores which materials a magnet will be able to attract through.

Thursday

Buzzer Game — Electrical circuit created with a buzzer box, alligator clips and wire, and brads. Buzzer will sound when one clip is on a brad that is attached to a magnet, and other clip is on a brad that is attached to an object of steel or iron.

Magnet Discovery Box — Magnets of various strengths and a supply of steel wool, paper clips, bottle caps, etc. Children experiment with finding the strongest/weakest magnets.

Friday

Magnet Boats — Small squares of floating styrofoam with iron or steel nails stuck through. Children can decorate boat, add a sail and float in shallow dish of water. A magnet, moved from underneath the dish will guide the boats.

Magnet Discovery Box — Children test clips and nails to see if made of iron or steel. Children then test to see if they can pick up steel wool with clips or nails to find out if they are magnets yet. They can then make them into magnets by pulling the nail or clip across one end of a magnet in <u>one</u> direction only. Count aloud for 20-25 strokes. Test nail/clip again to see if it is a temporary magnet.

Outdoors

Monday

Hang "Apples" on "Tree" — Draw a tree on butcher paper and cut out paper apples (or any type of fruit). Tape tree flat to slide's lower metal sliding area. Fruits will attach with small magnets (or use magnetic letters).

Magnetic Exploration — Allow children to explore outdoors with magnets. What will they attract to? What not?

Tuesday

Sand Fishing — Children can use magnet fishing poles in sand box to fish for paper fish (that have clips attached).

Wednesday

Toy Crane — Set out various objects for crane to lift.

Thursday

Magnetic Numbers and Letters — Children can decorate (steel) metal equipment and fence.

Friday

Magnet Boats — Made at option time, children can float in tubs of water.

Small Groups - All children should have equipment to use.

Experiment A

"Magnets are strongest at each end."

- Hold curved end of horseshoe magnet over steel wool. "Is any steel attracted to the middle of this magnet?"

- Hold the ends of the horseshoe magnet over the steel wool. "Do the ends act differently than the middle?" Try a bar magnet.

Experiment B

"Magnets pull some things but not others."

- Give each child a magnet and paper clip to try out. To see effect clearly, slide magnet toward clip on table top. To feel effect hold clip in palm of hand.

- "Do you think the magnet will pull everything to it?" "Let's find out with the things on the small trays."

- Exploration: Suggest sorting objects pulled by magnets from those that are not. Use stryo meat trays labeled "yes" and "no".

- Exploration: Things on the "yes" tray do not look alike, but they are made of the same stuff (iron or steel). Magnets pull only iron or steel.

Experiment C

"Each end of a magnet acts differently."

- Tie a string to the center of a magnet. Balance it.

- Let magnet hang and swing freely (may attach it to something). When it stops moving, one end of the bar magnet will be pointing North. Mark this with a piece of tape. Repeat steps with a second magnet.

- Let children hold a magnet in each hand, then try to touch like ends (North to North or South to South). "Do they push each other away?" Try to touch unlike ends. "What happens?"

Experimenc D

"Some magnets are strong."

- See option time — Counting Paper Clips (Monday) and Magnet Discovery Box (Thursday).

Date: one week (if done when snow is available, the possibility of activities is unlimited. This week was planned when no snow was around)
Area of Emphasis: Hot/Cold

Schedule	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	Location
Arrival & Free Choice 8:30-9:00	Science Center open throughout week with hot/cold contrast to feel and explore (and taste) • warming tray w/ dish • thermos w/ cool water	• heat pads • ice bags	• hot chocolate • cool juice	• warm wax • cooled wax	• raw eggs • scrambled eggs	
Breakfast 9:00-9:30	discussion about breakfast foods - identifying hot/cold; warm/cool - throughout week; carry over into breakfast				children prepare breakfast	Tables
Large Group	Songs with topics on hot and cold weather are sung throughout week Snow - thermometer - talk about & share Hot/cold weather Transition: Pictures	Story: The Beach Picnic Breakfast - Kitten Hot/Cold?	Story: The Snowy Day - Keats	Game - Who Looks Different?	Flannel board: The Sun that Wouldn't Shine Photos of people/animals	Rug Area
9:30-9:50	Song: "This is the Way..."	"Jack Be Nimble"		Game - "I'm Thinking of..."	Dramatizations	
Option Time - self-selected activities	- Dye making and egg Shell Dying Open Choice →	- Crayon Batik → (c.m.)	- Egg Shell Mosaics → (c.m.)	Waxed Leaves → (c.m.)	Ice Cube Candles → (c.m.)	• Creative media (c.m.)
	- Crushed ice and large tubs w/ small cars	Pool building	- Construction w/ props	- Crushed ice with containers, molds, cookie cutters	Eskimo builders (provide props & large blocks)	• Blocks
	- Cold weather dress-ups	- Hot weather dress-ups	- Cold weather dress ups.	- Hot Weather dress-Ups	Dish washing - cold and warm water	• Dramatic Play
	- Sorting - hot/cold pictures	- Willie Weatherman	- Willie Weatherman	Serving - ice cubes, ice pops, candle melting, baking, boiling water.	- Flannelboard dolls to dress - Sorting - hot/cold pictures	• Cognitive
	- Puzzles - snowmen, seasons, dressing for weather, etc. Available throughout week, along with open choice manipulative items.	→ (m.)	→ (m.)	→ (m.)	→ (m.)	• Manipulative (m.)
	- Learning experiences ① Ice bag/hot water bag Ice cubes/hot water	→ (s.c.) ② Thermometer - ice cubes, hot water, spoons - wooden, metal, plastic.	→ (s.c.) ③ Light bulbs - hot light/cool light	→ (s.c.) ④ Melting rates - colored ice cubes	→ (s.c.) ⑤ melting rate - of ice	• Science Center (s.c.)
	- Boiling Eggs	- Apple Fruit Fritters	- Mixing Ice Tea	- Playdough Biscuits	- Home-made Ice Cream	• Lunch prep.
9:50-10:50	Books available all week in science, tree and literary corner. Records on Winter, Summer, hot/cold topics (see guide-listing)					• Books
Outdoors 10:50-11:30	Hot sand/cold sand - digging Ice chest w/ ice and gloves	Thermometer Water balloons Ice chest with warm water for water play (bring plastic containers)	Beach dramatic play (pool) dress-ups and props. Collecting leaves (for leaves.)	Thermometer Ice chest with ice & food coloring	Tye-dying - T-shirts Ice cubes	Playground
Small Groups - teacher directed experiences 11:30-11:50	1. Experiment A 2. Experiment B	1. Exp. B 2. Exp. A	1. Tell-a-story - using pictures 2. Exp. C	1. Exp. C 2. Tell-a-story	1. Prepare props - talk about what is hot & what is cold. 2. Same as #1	Group 1 Group 2
Clean-up & Lunch 11:50-12:30	Scheduled lunch plus the lunch preparations done by the children boiled eggs	apple fritters	ice tea	biscuits	ice cream	

Date: One Week

AREA OF EMPHASIS: HOT AND COLD

GENERAL OBJECTIVES:

I. Social: To provide experiences for children to share information with one another and adults.

II. Cognitive: To help children learn to seriate (sequence, order) events by providing real experiences and materials. To help children increase their sciencing skills with hot and cold.

III. Emotional: To make children aware of their bodily sensations of touch.

IV. Language: To provide children with the opportunity to describe objects, places, and people.

BEHAVIORAL OBJECTIVES:

I. The child will share information about an activity he took part in with at least one other child and one adult, daily.

II. a. The child will, by the end of the week, experiment with hot and cold in at least 5 different activities and will be able to state or demonstrate at least 3 of the following concepts:

- "Some things can be made hot and/or cold.
- "Very cold water is ice."
- "Heat makes ice melt, water boil, food cook, wax melt."
- "Special clothes are worn when it's cold."
- "Special clothes are worn when it's hot."
- "I can feel cold/hot."
- "Food can be hot or cold when people eat it."

B. The child will correctly seriate in their order of occurance pictures of events at least once a day after a real experience has been provided.

III. The child will describe how it feels to hold something hot or cold, daily.

IV. The child will verbally identify objects, places, and/or people as being hot or cold/warm or cool in their correct context.

ACTIVITIES:

Arrival and Free Choice

Daily, children will be able to choose own activities for first ½ hour of day. Science table will display materials contrasting hot and cold. Children will be encouraged to freely explore. Wednesday and Friday the children will begin Breakfast at the science area. Wednesday they will taste and talk about hot and cold liquids. Friday they will prepare breakfast and talk about how eggs are changed by heat.

Breakfast - Lunch

Throughout week, children will be encouraged to describe their food, identify hot/cold, warm/cool and talk about how it feels in their hands and mouths. During lunch, the children will recall and seriate the steps involved to make boiled eggs, fritters, tea, biscuits, and ice cream. Recipe seriation cards will be used.

Large Group — Songs will be sung throughout week about hot/cold topics.

Monday

Show and talk about thermometers. Pass around several to children. See what putting your finger on the bulb does. Put thermometer in hot water, on a cold cube. See results. Talk about hot/cold weather, and how people dress and what you can do. Show pictures of some different types of weather. Transition to Learning Centers: Each child has to identify a picture as to whether it is hot or cold. Have pictures of an iron, ice, popsicle, fire, snow, boiling water, people dressed for different types of weather.

Tuesday

Read and talk about, if children want to The Beach Before Breakfast by Kumin. Use as preparation for dramatic playing during option time. Transition to Learning Centers: Song "This is the Way We..." This song is about the things we do each day of the week. Use activities that involve hot/cold experiences: Iron clothes, take a hot bath, wash dishes, bake bread, etc.

Wednesday

Give children hats, scarves and mittens to wear while reading the story, The Snowy Day by E. J. Keats. Use as preparation for dramatic playing during option time. Transition to Learning Centers: Nursery Rhyme "Jack Be Nimble". Children, take turns jumbing over a "candle" (a cylindrical block or real, unlit candle).

Thursday

One child leaves group and closes eyes. Children quickly choose someone to wear an article of clothing. Other child returns to circle and tries to guess "Who looks different?" Use winter and summer articles — hats, scarves, boots, bathing suits, sunglasses, mittens, beach thongs. Transition to Learning Centers: Teacher describes an object and children have to guess "What s/he is thinking of". Choose objects relating to hot/cold.

Friday

Flannelboard, "The Sun That Wouldn't Shine" — a story retold from the book, The Sun Grumbled. Talk with children about what they think would happen if the sun didn't shine. Transition to Learning Centers: Each child will secretly look at a photo of an animal or person and try to dramatize it to his classmates for them to guess.

Option Time — Self-selected activities.

Monday

Dye-making and egg shell dyeing. Dyes are made from food coloring; 1 tsp. vinegar and 1 cup boiling water. Dye shells, dry and crush. Separate colors into separate storage containers. Stress hotness, boiling and changing of white egg's color.

In Block Area put out tubs of crushed ice (snow) with small vehicles to pretend "snow storm".

Collect cold weather dress-ups for home-living, dramatic play center. Supply gloves, boots, coats, sweaters, socks, hats, etc.

Sorting hot/cold pictures. Magazine pictures and photos are used for children to group as to whether they show something hot, or cold.

Puzzles — commercial and teacher-made.

Science center learning experiences — have available ice bags and hot water bags; ice cubes and hot water. Allow children to explore. Provide gloves, warming tray, thermos.

Lunch preparation — break open one raw egg. Discuss, while water is on for boiling. Watch water, feel steam, hear bubbles. Place eggs in to boil. Talk and predict what will happen. When eggs are ready, open to see what happened. Can open eggs during boiling process to see at different stages of hardening.

Tuesday

Crayon Batik — Sprinkle crayon scrapings onto material (from an old sheet or pillow cases). Place waxed paper over several layers of newspaper and iron until crayons melt into material. Children can discuss what heat does to crayon bits. Variation: Child draws with crayon on fabric, iron for permanent picture.

Pool Building — Children can build a "pool" to go along with hot weather dress-ups in house area.

Hot weather dress-ups — supply sunglasses, beach towels, umbrellas, bathing suits, pails, shovels, beach balls, floats; to bring to "pool".

Willie Weatherman — Commercially-made color-forms activity. Dress-up Willie depending upon the weather.

Lunch preparation — Apple fruit fritters — children make, according to steps illustrated on sequencing cards. Cards show what ingredients to use and what to do (stir, spoon, cook, etc.) and than they can put cards in order of their proper sequence. Talk about hot steam from oil, cool batter, and hot fritters.

Wednesday

Egg shell mosaics — use crushed shells from Monday. Glue onto construction paper, small jars, stryofoam trays, wood, or anything children choose to use as the base.

Construction with props — supply block area with construction tools — hard hats, hammers, screw drivers, vehicles, etc..

Science Center — Have on display florescent lighting (cool) and incandescent lighting (hot). Give children gloves and/or potholders so they can feel the bulbs.

Making iced tea — provide recipe cards that show steps to follow to make iced tea. Observe steam from boiling water and see and hear what happens to ice cubes when they are dropped in.

Thursday

Make waxed leaves by dipping leaves (held by stems) into melted candle wax or parrafin. Stress melting of wax and its softness, and also how fast it dries and cools. See effect on leaves. Children can use leaves for a mobile or 3-D relief design.

Tubs of crushed ice (or snow) in block area. Provide materials the children can make prints with in the snow — small molds, cookie cutters, scoopers, containers, block shapes.

Seriate pictures of — ice cube melting, ice pop being eaten, a candle melting, muffins baking, boiling water. These are teacher-made materials.

Science center — Prepare in advance ice cubes of light and dark colors. With children, predict whether their melting rates will be different. Have children explore this.

Lunch preparation — Prepare and bake biscuits with children. Discuss changes that heat causes. Use recipe step cards.

Friday

Make ice cube candles. Fill greased juice cans with ice cubes. Insert postal string as the wick. Fill cans with hot wax that has been melted in a coffee can placed in a saucepan of boiling water. When solid, strip off juice can or pull out candle.

Eskimo Builders — Provide "Eskimo" clothes. The children can pretend they are building an "Igloo".

Dish washing or baby clothes laundering with cool and warm water in two separate tubs.

Flannelboard dolls — dress with clothes. Teacher-made.

Science Center — The Great Melting Race. Melt ice on a hot tray and on a cool tray. Melt a large block of ice and a small cube. Which melts first?

Make home-made ice cream. Talk about cooking ingredients and churning machine with ice surrounding it. What does ice do to ice cream mixture?

Outdoors

Monday

Hot sand/cold sand — Provide digging equipment. Encourage children to feel the difference in sand temperatures the deeper they dig.

Ice chest with ice — Use cubed or crushed ice (snow if available). Provide gloves and allow children to explore its melting abilities. Children can draw with ice, melt in sand, suck on it. Talk about why you need to wear gloves.

Tuesday

Thermometer — Encourage children to experiment with changing temperatures, "reading" the thermometer. Combine with water play.

Water Balloons — Fill balloons with water (warm), play catch.

Ice chest with warm water for water play and water "painting" the pavement. Provide containers, tubing, funnels, squeeze bottles, spray bottles, etc..

Wednesday

Beach Dramatic Play — Supply sunglasses, beach balls, pails, shovels, beach towels and blankets, shading umbrellas. Put in sand box. If possible, children can wear bathing suits and swim in the "ocean" (a platic wading pool or sprinkler).

Collecting Leaves — For Thursday's waxing leaves (during option time).

Thursday

Tie-dyeing. Use Rite Dyes (need hot water) or Dylon Dyes (cold water). Rubber bands wrapped around fabric makes neat designs. Dye shirts, socks, underwear, scarves, etc.. Dry clothes outdoors. Discuss temperature of water and effects of sun on clothes.

Large ice blocks (can buy at any ice supply store). Allow children to experiment with.

Small Groups

Experiment A

Have hot and cold objects. Blindfold a child and have them guess what it is and describe how it feels. Child who guesses, gets to choose next object to present to next blindfolded child. Talk about how one can feel with your eyes closed.

Experiment B

Two pots — one filled with ice water, one with boiling water. Drop food coloring in each. Equal amounts. Observe which water turns colored quicker? Discuss why?

Experiment C

Read story, One Mitten Lewis by Helen Kay. Then give each child one glove and two ice cubes, one for each hand. Talk about which hand feels cold first, and why. Discuss why people dress as they do.

Tell-A-Story

Children dictate a story to go with pictures. Write story under picture. Use cut-out pictures with hot and cold scenes.

House Props

Bring in objects such as a hair blower, a fan, a heating pad, an ice cube tray, etc.. Talk about how they feel when they are used.

SUPPLEMENT #5 - STORIES AND REFERENCES FOR CHILDREN

ABOUT AIR (INCLUDES WEATHER)

Cebulash, Mel. THE BALL THAT WOULDN'T BOUNCE. New York: Scholastic Book Services, 1972.

Keats, Ezra Jack. WHISTLE FOR WILLIE. New York: Vicking Press, 1964.

Mizumura, Lazue. I SEE THE WINDS. New York: Thomas Crowell, 1966.

Scarry, Richard. GREAT BIG AIR BOOK. New York: Radom House, 1971.

Smith, Howard E. PLAY WITH THE WIND. New York: McGraw Hill.

Lowery, Lawrence F. HOW DOES THE WIND BLOW? New York: Holt, Rinehart, and Winston, 1969.

ABOUT WATER

Ardizzone. LITTLE TIM AND THE BRAVE SEA CAPTAIN. New York: Scholastic Book Services.

Emberley, B. and E. ONE WIND RIVER TO CROSS.

Holl, Adelaide. THE RAIN PUDDLE. New York: Lothrop, Lee and Shepherd, 1965.

Keats, Ezra Jack. THE SNOWY DAY. New York: Viking Press, 1962.

Rosenfeld, Sam. A DROP OF WATER. Irvington on the Hudson, New York: Harvey House, 1970.

Schloat, Warren, Jr. THE MAGIC OF WATER. New York: Charles Scribner's Sons, 1955.

Bartlett, Margaret Farington. WHERE DOES ALL THE RAIN GO? Coward.

McCloskey, Robert. TIME OF WONDER. New York: Viking, 1957.

Woodard, Carol. THE WET WALK. Philadelphia: Fortress Press, 1968.

Kurth, Helen. DOWN THE RIVER. Puffin ed., New York: Viking Press.

Yashima, Taro. UMBRELLA. Puffin ed., New York: Viking Press.

ABOUT GRAVITY

Bright, Robert. GEORGIE AND THE MAGICIAN. New York: Doubleday and Co., 1966.

Goudey, Alice. THE DAY WE SAW THE SUN COME UP. New York: Charles Scribner's Sons, 1961.

Viorst, Judith. I'LL FIX ANTHONY. New York: Harper and Row, 1969.

ABOUT SIMPLE MACHINES

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ABOUT PLANT LIFE

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ABOUT ANIMAL LIFE

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ABOUT THE HUMAN BODY (Body Functions, Senses, Growing, Health)

(See also section on Sound)

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Fritz, Jean. GROWING UP. Chicago: Rand McNally, 1956.

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Stein, Sara Bonnett. ABOUT HANDICAPS: AN OPEN FAMILY BOOK.

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ABOUT COOKING AND FOOD:

(See also section on Plants)

Anglud, Joan Walsh. NIBBLE, NIBBLE MOUSEKIN. New York: Harcourt Brace Jovanovich, 1962.

Asch, Frank. GEORGE'S STORE. New York: McGraw-Hill, 1969.

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Sawyer, Ruth. JOURNEY CAKE, HO! New York: Viking, 1953.

Sendak, Maurice. IN THE NIGHT KITCHEN. New York: Harper.

Seus, Dr. GREEN EGGS AND HAM. New York: Random House, 1960.

Slepian and Seidler. THE HUNGRY THING. New York: Scholastic Book Services.

SUPPLEMENT #5 - TOPIC SCIENCE BOOKS

These books emphasize information and facts on various science topics. A teacher may read them to easily grasp the basic concepts so that s/he may design materials and activities that are appropriate for young children.

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Pine, Tillie S. AIR ALL AROUND. New York: McGraw-Hill, 1960.

Shapp, Martha and Charles. LET'S FIND OUT ABOUT AIR. New York: Franklin Watts, 1963.

ABOUT WATER:

Branley, Franklyn. RAIN AND HAIL. New York: Crowell, 1963.

Green, Irah. WATER: OUR MOST VALUABLE NATURAL RESOURCE. New York: Coward-McCann, 1958.

Pine, Tillie, and Levine, Joseph. WATER ALL AROUND. New York: Whittelsey House, McGraw-Hill, 1959.

Riedman, Sarah R. WATER FOR PEOPLE. New York: Abelard-Schuman, 1961.

Helfman, Elizabeth S. WATER FOR THE WORLD. New York: McKay, 1960.

Podendorf, Illa. THINGS TO DO WITH WATER. Chicago: Chilren's Press, 1971.

Sootin, Harry. EASY EXPERIMENTS WITH WATER POLLUTION. New York: Scholastic Book Services, 1974.

ABOUT GRAVITY

Freeman. GRAVITY AND THE ASTRONAUTS. New York: Scholastic Book Services.

Milgrom, Harry. ADVENTURES WITH A CARDBOARD TUBE. New York: E.P. Dutton, 1972.

Branley, Franklyn. GRAVITY IS A MYSTERY. New York: Thomas Y. Crowell, 1970.

ABOUT SIMPLE MACHINES

Buehr, Walter. STORY OF THE WHEEL. New York: G.P. Putnam's Sons, 1960.

Pine, Tillie S., and Levine, Joseph. FRICTION ALL AROUND. New York: Whittlesey House, McGraw-Hill, 1960.

Schneider, Herman and Nina. NOW TRY THIS. New York: William H. Scott, 1957.

ABOUT MAGNETS

Freeman, Mae. THE REAL BOOK OF MAGNETS. New York: Scholastic Book Services, 1967.

Holden, Raymond. MAGNETISM. New York: Golden Press, 1962.

Parker, Bertha M. MAGNETS. New York: Harper and Row, 1958.

Reuben, Gabriel and Archer, Gloria. WHAT IS A MAGNET? Chicago: Benefit Press, 1959.

ABOUT SOUND

Hawkinson, John and Faulhaber, M. MUSIC AND INSTRUMENTS FOR CHILDREN TO MAKE. Chicago: Whitman, 1969.

Pine, Tillie and Levine, Joseph. SOUNDS ALL AROUND. New York: McGraw-Hill, 1959.

Podendorf, Illa. SOUNDS ALL ABOUT. Chicago: Children's Press, 1970.

ABOUT LIGHT AND COLOR

Adler, Irving. COLOR IN YOUR LIFE. New York: John Day, 1962.

Bustanoloy, Jo H. PRINCIPLES OF COLOR AND COLOR MIXING. New York: McGraw-Hill, 1947.

Alexenberg, Melvin. LIGHT AND SIGHT. Englewood Cliffs, New Jersey: Prentice-Hall, 1969.

Neal, Charles D. EXPLORING LIGHT AND COLOR. Chicago: Children's Press, 1964.

ABOUT STATIC AND CURRENT ELECTRICITY

Branley, Franklyn M. FLASH, CRASH, RUMBLE AND ROLL. New York: Thomas Y. Crowell, 1964.

Notkin, Jerome, and Gulkin, Sidney. THE HOW AND WHY WONDER BOOK OF ELECTRICITY. New York: Wonder Books, 1960.

Shepherd, Walter. ELECTRICITY. New York: Golden Press, 1966.

ABOUT ROCKS AND MINERALS:

Evans, Eva Knox. THE ADVENTURE BOOK OF ROCKS. New York: Capital Publishing, 1955.

White, Anne Terry. ROCKS ALL AROUND US. New York: Scholastic Book Services, 1959.

Wyler, Rose. EXPLORING EARTH SCIENCE. Racine, Wisconsin: Western Publishing, 1973.

ABOUT PLANT LIFE

Podendorf, Illa. THE TRUE BOOK OF PLANT EXPERIMENTS. Chicago: Children's Press, 1972.

Busch. ONCE THERE WAS A TREE. New York: Scholastic Book Services.

Cooper, Elizabeth K. SCIENCE IN YOUR OWN BACK YARD. New York: Harcourt, Brace, 1960.

Russell, Helen Ross. TEN-MINUTE FIELD TRIPS: USING THE SCHOOL GROUNDS FOR ENVIRONMENTAL STUDIES. Chicago: J. G. Ferguson, 1973.

Selsam, Millicent. PLAY WITH SEEDS. New York: Morrow, 1957.

Skelsey, Alice, and Huckaby, Gloria. GROWING UP GREEN. New York: Workman Publishing, 1973.

Wood, Dorothy. PLANTS WITH SEEDS. Chicago: Follett, 1963.

ABOUT SMALL ANIMALS, GENERAL AND INSECTS

Alstrop, Jack Bentley. ENJOYING PETS. New York: Vanguard, 1955.

Conklin. WE LIKE BUGS. New York: Scholastic Book Services.

Green, Ivah. ANIMALS UNDER YOUR FEET. Scranton, Pa: Laurel Press, 1958.

Zim, Herbert. GOLDEN HAMSTERS. New York: William Morrow, 1951.